LISTing Newsletter

Newsletter of the Long Island Sinclair/Timex Users Group
(Incorporating N.Y.T.S.E.)

JUNE 1993
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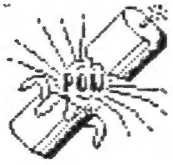
JUNE 1993 Issue

Next Meeting June 13

USE "OVER" FUNCTION WITH THIS ONE →



SWAP & SHOP
EXPLOSIVE DEALS!

SUMMER PROJECTS

Listing Policy

Annual Dues...$ 16.00

One "sample" copy sent upon reciept of a large SASE.
Copies provided on EXCHANGE BASIS with other bona fide user groups.
LISTing is published monthly except July and August by LIST (Long Island Sinclair Timex) Group, a non profit user group.

We are always looking for articles, programs, reviews, etc. to keep our members informed and entertained. You maintain full copyright.

LIST disclaimes any responsibility for any damage you may do to your computer as a result of reading any articles in LISTing.

LIST OFFICERS

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TRES.	ROBERT MALLOY
COR.SEC.	JOHN PAZMINO
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PLEASE SEND SUBMISSIONS TO:
LISTING
MR. FREDERIC STERN
P.O. BOX 264
HOLBROOK, N.Y. 11741

COMING EVENTS:

JUNE 13, 1993 LIST MEETING.

SPECIAL NOTICE

THE NEXT MEETING WILL BE HELD AT THE ICE CREAM DISPENSARY
(HARVEYS STORE)
334 DOGWOOD AVENUE
FRANKLIN SQUARE, N.Y.
TEL: 516-486-1090

DIRECTIONS; SOUTHERN STATE PKWY TO EXIT 17 NORTH (HEMPSTEAD AVE) GO TO FIRST TRAFFIC LIGHT, LEFT TURN ON TO CORNWALL, NEXT TRAFFIC LIGHT, BEAR RIGHT ON TO DOGWOOD AVENUE. GO 1 MILE TO THE ICE CREAM DISPENSARY, IN A SMALL SHOPPING CENTER ON THE LEFT SIDE OF THE ROAD.

MEETING MINUTES
REPORTED BY: FRED STERN
MAY 16, 1993

HARVEY CALLED THE MEETING TO ORDER AT 2:30PM.

WE RECEIVED NO CORRESPONDENCE, NEW OR RENEWED MEMBERSHIPS THIS MONTH.

WE RECEIVED THE LATEST RMG T/S CATALOG, WHICH CONTAINS MANY GOOD DEALS ON HARDWARE AND SOFTWARE FOR THE TS1000, TS2068 AND QL.
THIS CATALOG IS AVAILABLE FOR REVIEW AT LIST MEETINGS, OR YOU CAN GET YOUR OWN FROM;
RMG ENTERPRISES
1419-1/2 7TH. STREET
OREGON OR, 97045
FAX: 503-655-4116 (24 HRS)
TELL THEM YOU SAW THIS ARTICLE IN LISTING.

IT IS KNOW SECRET THAT OUR RANKS OF TIMEX/SINCLAIR USERS AND SUPPORTERS ARE DWINDELING. IN ORDER TO MAINTAIN AND ENHANCE PUBLICATION OF LISTING, THE FOLLOWING CHANGES WERE DISCUSSED, AND AGREED UPON AT THE MEETING BY THE ATTENDING MEMBER;

NON-DUES PAYING, HONARARY, NON-ACTIVE MEMBERS WILL NO LONGER RECEIVE COMPLIMENTARY SUBSCRIPTIONS TO LISTING. THIS ACTION IS NECESSARY TO REDUCE PRINTING AND POSTAGE EXPENSES.

THE NEWSLETTER EXCHANGE WILL NOT BE EFFECTED. WE WILL CONTINUE TO SEND A COMPLIMENTARY COPY OF LISTING TO ALL T/S USER GROUPS WHO SEND A COMPLIMENTARY COPY OF THEIR NEWSLETTER TO US.

SINCE WE HAVE NOT RECEIVED ANY CORRESPONDENCE FROM OUR SISTER GROUP (NYTSE) AND DO NOT KNOW IF THEY ARE ACTIVELY MEETING AT MISS KIMS, WE ARE GOING TO DISCONTINUE NOTIFICATION OF THEIR MEETINGS IN THIS PUBLICATION.

IF YOU WANT TO GIVE OR GET INFORMATION, TO OR FROM LIST, PLEASE CONTACT HARVEY 11:00AM-8:00PM AT 516-486-1090. (THE ICE CREAM DISPENSARY).

MEETING - SWAPMEET

OUR ANNUAL SWAPMEET WILL BE HELD BEFORE THE NEXT MEETING, AT THE ICE CREAM DISPENSARY, STARTING AT 1:00PM. FOR TRAVEL DIRECTIONS BY CAR (SEE ABOVE). FOR DIRECTIONS BY LIRR, CALL HARVEY AT 516-486-1090.

CLASSIFIEDS

THIS CLASSIFIED SECTION IS AVAILABLE TO ALL LIST MEMBERS FREE OF CHARGE.
THE ONLY RESTRICTION IS THAT IT IS TO BE USED ONLY FOR THE SEEKING, SELLING OR SWAPPING OF SINCLAIR, TIMEX OR MICROACE COMPUTER EQUIPMENT, PERIPHERALS AND SOFTWARE.
LISTING, LIST, AND ITS OFFICERS DO NOT ENDORSE, WARRANTY, OR GUARANTEE ANY OF THE ITEMS LISTED IN THIS CLASSIFIED SECTION

THE FOLLOWING PUBLICATIONS ARE AVAILABLE ONLY THROUGH LIST:

ZX-81/TS1000 TECHNICAL TIDBITS
TECHNICAL TIDBITS PART II
SAVINGS AND LOAD OF THE TIMEX COMPUTER
$4.00 EACH.

JUNE LIST MEETING IS OUR ANNUAL SWAP MEET, DO NOT FORGET...

MAX (A NEW MEMBER) HAS A TANDY 640K COMPUTER WITH COLOR MONITOR ALL BOOKS, NEVER USED, $295.00 CALL MAX AT 516-485-4236.

CONTINUE;- PAGE 7

QL CORNER

Believe it or not, 1993 is the tenth anniversary of the launch of the QL! It seems like yesterday that I assembled my QL kit which was purchased from A+ Response. I useed it for approximately two weeks to get the feel of it and then packed it up to be used some other time in the near future - one year later and it has been my computing partner ever since.

Several years later, Sinclair Research Ltd. sold out to Amstrad and all production of the QL was over - but the QL would not die! Thanks to QL users, the many QL user groups around the world and the few devout hardware and software suppliers who didn't give up the ghost; the QL will live on for some years to come.

Jurgen Falkenberg of Computer Technik, Germany, is one hardware manufacturer who keeps on producing quality hardware for the QL. His Keyboard 90 interface provides full compatibility with a QL and any XT-AT old or new keyboard, by selecting the keyboard with the use of two slide switches. Many additional key functions are also available.

A QL hard disk interface is also available which will support 20 Mb, 80 Mb and 122Mb hard disks housed in a case with power supply or if you wish, all of the components are available separately; the QL-HDD card, HDD card with OMTI-controler and the various hard drives.

Falkenberg's latest hardware item is the QL-2000, a tower case for the QL in kit form or built up to several different specs. The completed version comes with a QL, KB 90 interface, floppy and hard disk interface, a Gold Card, a 3.5", 1.44 meg floppy drive, a 20 Mb hard drive and a 102 key keyboard at DM 2499. The Toewr case measures 5 x 13 x 17 inches.

Bob Dyl, publisher of the International QL Report will display his QL-2000 computer at the 'Miracle in Newport 93' show on Saturday, June 5th.

There are many more hardware items listed in Falkenberg's catalog, such as a QL-ROM card and various QL-BUS drivers. Why not send him two International Reply Cupons for his multi-page catalog of hardware and software items. His address is: Computer Technik, Jurgen Falkenberg, Thanweg 36 , D-7539 Ersingen, Germany.

A good source of new surpluss items such as switching powersupplies for floppy or hard drives, prices range from $6.95 to $25.95. Voltage regulators, transformers, switches, semi-conductors, connectors for diskdrive cables, tools and so on. He is the most reliable supplier I use. Everything that Marlin P. Jones sells is guaranteed to work! I have been purchasing items from this firm for approximately 20 years. Two years ago he had advertised NEW TEAC 5-1/4", 720 K drives at $25.00. I ordered two of them. One drive was not in alignment, I called them, stated the problem. they requested that I return the defective drive and paid for the shipping to them. Request a catalog: Marlin P. Jones & Assoc., P. O. Box 12685, Lake Park, FL 33403-0685. Telephone: 407-848-8236.

Just a reminder that in a few weeks many of the U.K. hardware and software suppliers will be attending the 'Miracle at Newport 93' show. It will be at the salvation Army Building on Memorial Blvd; Newport RI. Time 1 PM to 6 PM.

See you next month....Bob Gilder

TECH TALK

USING ABACUS TO PREPARE DATA FOR STATISTICS PROGRAM

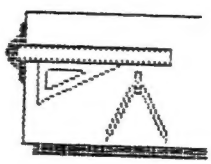
By Bob Malloy

Those of you who belong to Quanta, and therefore have access to their excellent library of programs, may have wished for a way to put existing data into Timo Salmi's Statistics program without having to retype everything. Fortunately there is a way, if the data you wish to analyze is in Abacus. Simply load your data (in columns) and then follow the instructions which follow.

INSTRUCTIONS:

Have text at first row
Balance of column should have numbers
Text should have no spaces
If column width is 10 then text should be no more than 8
Print the data to a FILE. NO BORDER
An example of how the data should look is below.

BLOCK	SANIFILL	SARALEE	CONVEX
19.25	14.375	24	5.5
18.75	14.75	24.375	5.375
19.25	14.25	24.75	5.375
19.375	14.5	24.75	5.5
19	14.5	24.75	5.5
18.75	14.375	24.25	5.375
18.375	14	23.75	5.25
18.25	14	23.25	5.25
17.875	13.75	23	5
18.375	14.25	25.875	4.75
18.25	14.25	25	4.75
18.625	14.375	26.125	4.5
18.25	14.375	26.125	4.625
18.125	14.5	26	4.625
18	14.5	25	4.625
18	14.375	25.125	4.625
17.875	14.375	25	4.625
17.875	14.75	24.875	4.75
17.375	15.75	24	4.875
17	15.5	24.125	4.875
17	15.5	24.5	4.75
17.125	15.5	25.125	4.875
17.5	15.625	25.375	4.875
17.625	15.75	25.875	5.125
17.75	16	26	5.125
17.375	16.25	25.375	5.125
18	16.5	25.375	4.875
17.875	16.25	26	4.75
17.875	16.125	25.5	4.75
17.875	16.25	25.75	4.75



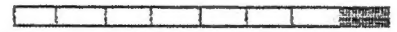
Bits And Bytes

The Read Only Memory (ROM) chips hold information that has been built into them. The RAM chips can remember what you tell them. But the only thing these two kinds of chips can remember are "on" and "off."

The memory chips are divided into thousands of little compartments called bits. Each bit is either "on" or "off." The bits are grouped together in eights:

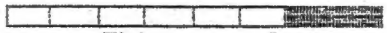
Each group of eight bits is called a byte.

There are 256 possible combinations of "On" or "Off" in a group of eight. You can see how you can count with these:

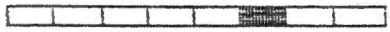


White = "On" - This byte = 1

This byte = 2

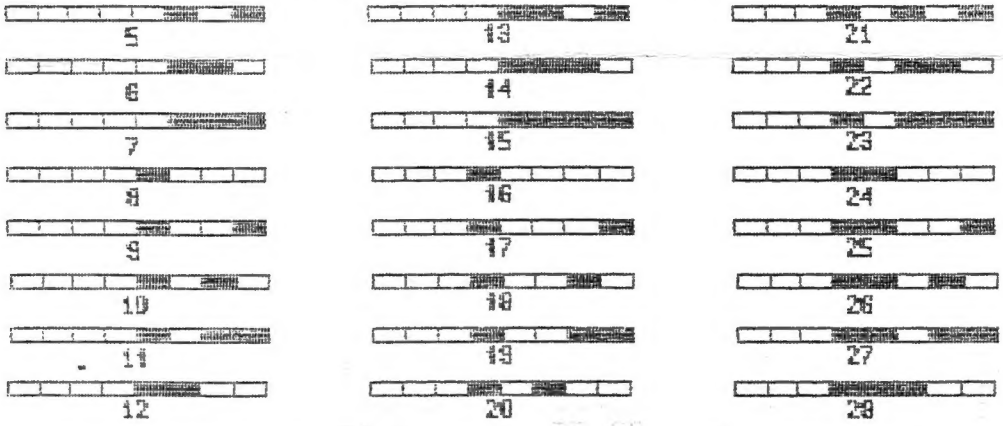


This one = 3



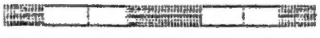
And this one = 4

BINARY COUNTING

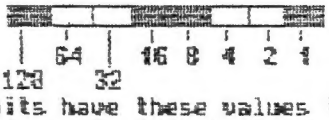


For this course, you don't have to learn binary counting - just know that this is how the computer uses combinations of on and off to count.

However, if you want to give it a try, name this number:



Here's a hint: Remember that the rightmost position, if "on" is worth 1. The next position to the left is worth twice that, if "on" is therefore worth 2, and the next one to the left of that is worth 4 and then the next is 8, and so on. Just add the ones that are "on" together.



The bits have these values if turned on. So to get the decimal value of the byte, add up the values of the "on" bits.

128
+16
+8
+1
= ?

Answer on next page.

The answer is 145

The computer can use bytes to represent more than just numbers. There are less than 256 letters, numbers and punctuation marks in the English language. A code number has been assigned to each one.

This code system is called ASCII. (American Standard Code for Information Interchange)

With the ASCII numbers, a byte can therefore represent any standard character. Here are some examples:

$122 = 'z'	$50 = '2'
$74 = 'J'	$97 = 'a'
$36 = '$'	$63 = '?'
$44 = ','	$112 = 'p'

Bytes can also be used to represent instructions. You could invent a code in which each of the 256 possible combinations of bits is a different instruction to the computer. For instance, if 34 means put a red dot in the middle of the screen, and if 176 means move that dot to the left... You get the idea, that's programming. Of course there are more than 256 things you could have the computer do, so combinations of many bytes, each representing a simple instruction, can be used to build a complex instruction.

Programmers don't actually have to remember the numbers assigned to bytes, because their programming languages themselves are programs that assign English-like words to the instructions contained in the bytes. Here is a sample from a programmer's scrap pile, this example is actually from the program that is running in the background right now - What's In That Box:

```
begin
  cleardevice;
  assign(outfile,'help');
  readfile;
  u := readkey;
  menu;
end; {procedure help}
```

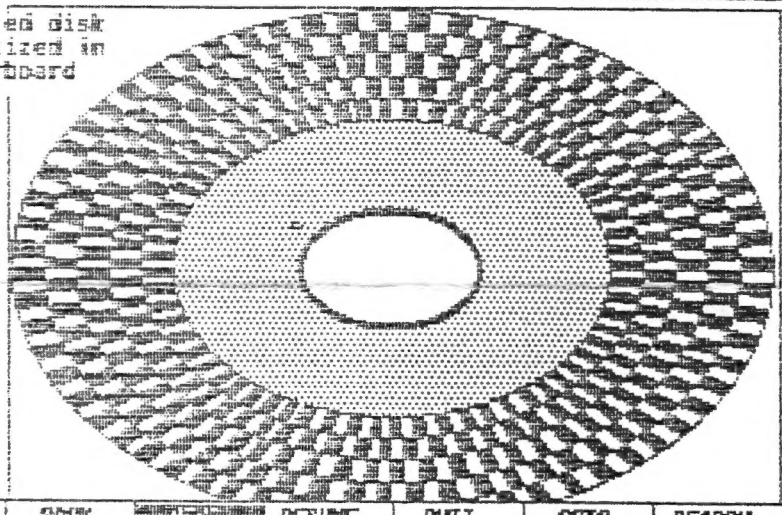
(This pops up the help screen.)

HELP | BACK | RESUME | QUIT | GOTO | SEARCH | COLOR

And so you can see - everything the computer does is coded into numbers no bigger than 256. These are stored as bytes, groups of 8 ons and offs. With enough bytes, very complex programs can accomplish amazing feats of information processing.

HELP | BACK | RESUME | QUIT | GOTO | SEARCH | COLOR

A formatted disk is magnetized in a checkerboard pattern.



HELP | BACK | RESUME | QUIT | GOTO | SEARCH | COLOR

Once a program is transferred from the disk into the RAM chips, it is ready to be run. The program's instructions are read by the CPU and carried out. Perhaps part of the RAM will be used for a scratch pad to hold data as it is being changed. For instance, if you are writing a letter with a word processing program, that letter will exist in the RAM. If the power was turned off, the letter would be lost unless you first copy it onto a disk.

A FINAL WORD
##############################
MY NAME IS FRED STERN AND I AM THE EDITOR OF THIS EDITION OF LISTING.

I HAVE 2 REMINDERS FOR YOU ALL:
1) THIS WILL BE OUR LAST LIST MEETING UNTIL SEPTEMBER.
2) THE NEXT ISSUE OF LISTING WILL BE IN AUGUST, BFORE THE NEXT MEETING.

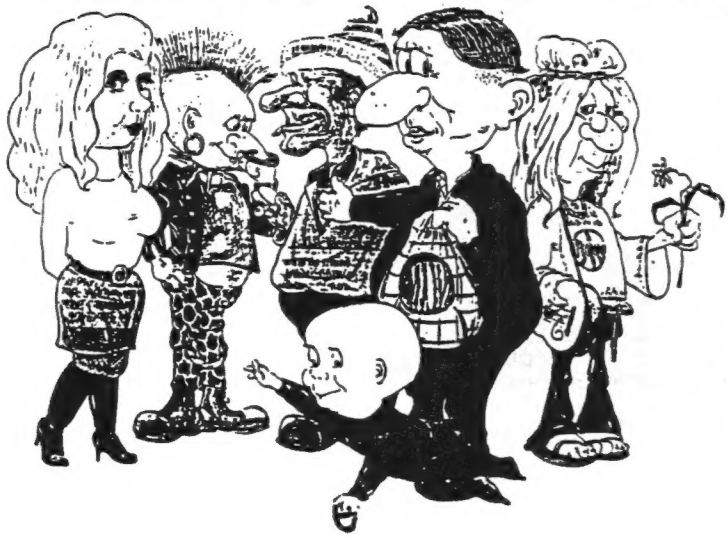
WE ARE REPRINTING FROM THE PLOTTER, DEC. 92 A SERIES OF EXCELLENT ARTICLES BY MR. DICK WAGNER CALLED ADVICE, 2068 AND ADVICE, 1000. I HOPE YOU FIND THEM AS ENJOYABLE AS I HAVE. (THANK YOU MR. WAGNER.)

SPECIAL THANKS TO TOM SKAPINSKI, BOB GILDER AND BOB MALLOY FOR THEIR CONTRIBUTIONS AND ASSIS-TANCE.

A VERY SPECIAL THANK YOU TO HARVEY FOR HIS HOSPITALITY, AND THE USE OF HIS STORE FOR OUR MEETING. ALSO TO MIKEY FOR HIS CONTRIBUTIONS.

SEE YOU ALL AT THE NEXT MEETING - SWAPMEET, AND HAVE A NICE, HEALTHY AND SAFE SUMMER.

Meet the Gang!



ADVICE, 2068

Dick Wagner

This 2068 program features a bit of wisdom from Charles F. Kettering, long time inventor at General Motors. The character codes in the DATA statements produces the text. Three READ commands are used to format the text.

It should be noted that "n" for each READ loop must equal the length of each statement.

```
  10 REM type this progam and ge
t some sound advice
  20 REM DICK F. WAGNER, NOV. 19
92
 100 FOR n=1 TO 86
 110 READ A: PRINT CHR$ A;
 120 NEXT n
 125 PRINT : PRINT
 130 FOR n=1 TO 26
 140 READ B: PRINT CHR$ B;
 150 NEXT n
 160 PRINT : PRINT : PRINT
 170 FOR n=1 TO 20
 180 READ C: PRINT CHR$ C;
 190 NEXT n
 300 DATA 77,121,32,105,110,116,
101,114,101,115,116,32,105,115,3
2,105,110,32,116,104,101,32,102,
117,116,117,114,101,32,32,32,32
 310 DATA 98,101,99,97,117,115,1
01,32,73,39,109,32,103,111,105,1
10,103,32,116,111,32,115,112,101
,110,100,32,116,104,101,32,32,11
4,101,115,116
 320 DATA 32,111,102,32,109,121,
32,108,105,102,101,32,116,104,10
1,114,101,46
 330 DATA 32,32,32,32,32,32,67,1
04,97,114,108,101,115,32,70,46,3
2,75,101,116,116,101,114,105,110
,103
 340 DATA 84,72,69,32,67,72,79,7
3,67,69,32,73,83,32,89,79,85,82,
83,46
```

ADVICE TS1000

Dick Wagner

This program produces the same text for the TS 1000 that the program "ADVICE 2068" does. The data code is different because of the difference between the 2 computer types. Luckily, the character codes for the TS 1000 are exactly 27 digits less than for the 2068. Comparing code tables, numbers are 20 digits less than the 2068 but none are used here.

The data is in 5 strings, about one for each text line. As the data is in string form, the separating commnas require special treatment as used in the program. This method requires the program to jump to line 200 each time a comma is read.

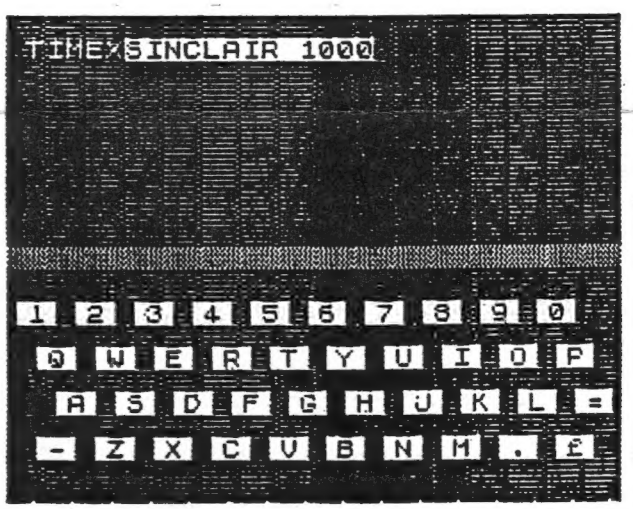
Line 205 simply converts the text data strings to numeric form so line 210 can print it. To prove this add a PRINT F; immediately after line 205

Considerable testing was required as the program development progressed, but I was working with my 2068 computer because I wished to do the hard copy on my large printer. The data didn't make sense except that spaces were question marks, and periods were 6s. My solution is in the article "READ TS 1000 ON A 2068".

The use of strings to input data, and change the data into numeric digits, is one of several ways of simulating READ & DATA such as is available on a 2068 computer.

FAST puts the program thru nicely but pressing the ENTRY key is required to show the display. Using SLOW displays the characters being printed on the screen. Take your pick by adding a fast or slow line to the program.

```
  5 REM THIS TS 1000 PROGRAM RE
ADS STRINGS TO PRINT OUT A MESSA
GE
  10 LET A$="50,62,0,46,51,57,42
,55,42,56,57,0,46,56,0,46,51,0,5
7,45,42,0,43,58,57,58,55,42,"
  12 LET B$="0,0,0,0,39,42,40,38
,58,56,42,0,46,0,38,50,0,44,52,4
6,51,44,0,57,52,0,56,53,42,51,41
,0,57,45,42,"
  14 LET C$="0,55,42,56,57,0,52,
43,0,50,62,0,49,46,43,42,0,57,45
,42,55,42,27,"
  16 LET D$="0,0,0,0,0,0,0,0,0,0,0
,0,40,45,38,55,49,42,56,0,43,27,
0,48,42,57,57,42,55,46,51,44,"
  18 LET E$="0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,57,45,42,0,40,45,52,46,40,4
2,0,46,56,0,62,52,58,55,56,27,"
  20 LET A$=A$+B$+C$+D$+E$
 120 LET M=1
 130 FOR N=1 TO LEN A$
 140 IF A$(N)="," THEN GO SUB 20
0
 150 NEXT N
 200 LET F$=A$(M TO N-1)
 205 LET F=VAL F$
 210 PRINT CHR$ F;
 220 LET M=N+1
 230 RETURN
```



READ TS 1000 ON A 2068

Dick Wagner

As it was explained in my article ADVICE TS1000, there was a need to get a hard copy of the TS 1000 program on my large printer. For editorial reasons, I also wished to have a properly running program without errors for the TS 1000 computer. To do this required the actual program to be tested without typing the program on the TS 1000. This meant making a LLIST from the 2068 with a TS 1000 program, properly tested. The inclussion of character codes is what made it a problem.

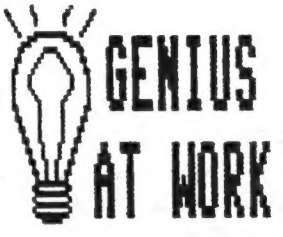
The program following will not work on the TS 1000 because it includes the conversion to 2068 code. Use the program in the TS 1000 article. TS 2068 users can use the program as it converts the TS 1000 codes to 2068 character codes, producing the identical results. The program in ADVUCE 2068 will look a little different but the text is identical.

The character codes for the TS 1000 are exactly 27 less than the 2068 codes for the capital letters. By adding 27 to the TS 1000 codes the text will be correct for the 2068 display. My program does exactly that by adding 27 to each code in the strings. Line 204 does this.

Two characters used in the program do not work properly by adding 27 to their codes, space and period. As 27 is added to them automatically lines 206 and 207 compensate for the differences. A question mark shows up for "space", and a "6" is displayed where the periods should be, without making the mentioned corrections.

One problem with making a continious A$ is that the line formatting must be made in the strings. That is the reason for so many zeros being used. If each string had been processed separately then formatting would have been easier. This would have required sending each string to a subroutine for printing.

```
  3 REM THIS PROGRAM CONVERTS T
S1000 TEXT CODE TO 2068 TEXT COD
E. LINE 204, 27 IS CHANGED TO 20
 FOR NUMBERS.
  5 REM BY DICK WAGNER, NOV. 19
92
 10 LET A$="50,62,0,46,51,57,42
,55,42,56,57,0,46,56,0,46,51,0,5
7,45,42,0,43,58,57,58,55,42,"
 12 LET B$="0,0,0,0,39,42,40,38
,58,56,42,0,46,0,38,50,0,44,52,4
6,51,44,0,57,52,0,56,53,42,51,41
,0,57,45,42,"
 14 LET C$="0,55,42,56,57,0,52,
43,0,50,62,0,49,46,43,42,0,57,45
,42,55,42,27,"
 16 LET D$="0,0,0,0,0,0,0,0,0,0,0
,0,40,45,38,55,49,42,56,0,43,27,
0,48,42,57,57,42,55,46,51,44,"
 18 LET E$="0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,57,45,42,0,40,45,52,46,40,4
2,0,46,56,0,62,52,58,55,56,27,"
 20 LET A$=A$+B$+C$+D$+E$
120 LET M=1
130 FOR N=1 TO LEN A$
140 IF A$(N)="," THEN GO SUB 20
0
150 NEXT N
200 LET F$=A$(M TO N-1)
204 LET F=VAL F$+27
206 IF F=27 THEN LET F=32
207 IF F=54 THEN LET F=46
210 PRINT CHR$ F;
220 LET M=N+1
230 RETURN
```



```
  100 BORDER 1: CLS
  120 PRINT AT 0,11; INK 2; BRIGH
T 1;"SINE WAVE"
  130 PRINT AT 1,2;"PEAK R.M.S. a
nd AVERAGE VALUES"
  200 PLOT 0,110: DRAW 255,0
  210 FOR Q=0 TO 255
  220 PLOT Q,110+40*SIN (Q/64*PI)
  230 IF Q=255 THEN GO TO 300
  240 NEXT Q
  300 PRINT AT 15,8; INK 1;"SELEC
T FUNCTION"
  310 PRINT AT 16,2;"1---PEAK VAL
UE";AT 17,2;"2---RMS. VALUE";AT
18,2;"3---AVERAGE VALUE"
  320 INPUT "Select 1, 2,or 3";A
  330 IF A<1 OR A>3 THEN GO TO 32
0
  340 IF A=1 THEN GO TO 400
  350 IF A=2 THEN GO TO 500
  360 IF A=3 THEN GO TO 600
  400 GO SUB 1000
  410 PRINT AT 14,10;"PEAK VALUE"
  420 PRINT AT 15,7;"INPUT RMS. V
ALUE"
  430 INPUT "RMS. VALUE ";R
  440 LET Q=R*1.414
  450 PRINT AT 18,4; INK 2; BRIGH
T 1;"PEAK VALUE = ";Q
  460 GO SUB 1020
  470 GO TO 300
  500 GO SUB 1000
  510 PRINT AT 15,7;"INPUT RMS. V
ALUE"
  520 PRINT AT 15,7;"INPUT PEAK V
ALUE"
  530 INPUT "PEAK VALUE ";P
  540 LET Q=P*0.707
  550 PRINT AT 18,4; INK 2; BRIGH
T 1;"RMS. VALUE = ";Q
  560 GO SUB 1020
  570 GO TO 300
  600 GO SUB 1000
  610 PRINT AT 14,10;"AVERAGE VAL
UE"
  620 PRINT AT 15,8;"INPUT PEAK V
ALUE"
  630 PRINT "PEAK VALUE ";P
  640 LET Q=P*0.637
  650 PRINT AT 18,4; INK 2; BRIGH
T 1;"AVERAGE VALUE = ";Q
  660 GO SUB 300
1000 FOR Q=14 TO 21: PRINT AT Q,
0; PAPER 2;"
                ": NEXT Q
1010 RETURN
1020 PAUSE 200: FOR Q=14 TO 21:
PRINT AT Q,0;"
                ": NEXT Q
1030 RETURN
2000 SAVE "sine" LINE 10
```

MAKING WAVES for the 16K Spectrum will work out the average RMS and peak values of an alternating sine wave. A menu is displayed and you must select one of the functions. If you want to find the peak value the program will ask you to enter the known RMS value; it is the other way round to find the RMS value and if you want to find the average value no input is required.

The graphics of the program are good and make this a fine educational program and mathematical aid. The program was sent by David Price, of Caerphilly, Glamorgan.

making WAVES